

communication device operates to ring all other telephone extensions connected to that telephone line. This embodiment is discussed further below.

If the user telephony communications device is determined to not be connected to the remote data site in step 416 when the call to the assigned second telephone number is received in step 414, then in the preferred embodiment the communication server 122 plays a recorded voice message asking the calling party to please try the number again. In this embodiment the user telephony communications device is configured to disable the call forwarding operation made in step 306 after the user telephony communications device disconnects from the remote data site. When this occurs telephone calls that are originally made to the first telephone number are received by the remote user without any call forwarding operations being performed.

Thus, there is a small window of time after the user telephony communications device disconnects from the remote data site and before the user telephony communications device disables the call forwarding operation. During this period of time, a party which dials the first telephone number in an attempt to call the user will still be forwarded to the communication server 122 at the remote data site, even though the user has already disconnected from the remote data site. It is noted that a call to the first telephone number which is forwarded to the assigned second telephone number after the user has disconnected should rarely occur, since this time window is relatively short. Where this does occur, the voice message informs the calling party to try the call again. When the calling party tries the call again, the call forwarding will presumably have been discontinued by the time the calling party tries again. Thus this voice message will be played at most once for a calling party.

25 User Disconnects from the Remote Data Site (Alternate Embodiment)

The operation of the user telephony communications device 104A in this embodiment when data communications are terminated with the remote data site is substantially similar or identical to steps 332 - 336 discussed with reference to Figure 3C. Thus, these steps are not described again here for simplicity.

Figures 7A and 7B: Operation of User Telephony Communications Device.

Figures 7A and 7B are a flowchart diagram illustrating operation of the user telephony communications device according to the method described with reference to Figures 6A - 6C. Steps which are similar or identical to the steps in Figures 6A - 6C have the same reference numerals for convenience. Due to the similarity of Figures 7A - 7B and Figures 6A - 6C, only steps which are different in Figures 7A and 7B are explained for convenience.

As shown in Figure 7A, step 405 is a counterpart to step 404 shown in Figure 6A. In other words, in step 404 of Figure 6A the remote data site transmits an assigned second telephone number to the user telephony communications device. In step 405 of Figure 7A the user telephony communications device receives the assigned second telephone number from the remote data site, which was transmitted by the remote data site in step 404 of Figure 6A.

In Figure 7B, step 415 encompasses certain functionality of steps 413 - 420 in Figure 6C. In step 415 the user telephony communications device receives a telephone call forwarded from the remote data site.

Figures 8A/B - Remote Data Site Call Forwards Telephone calls

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Referring now to Figures 8A and 8B, a flowchart diagram illustrating operation of a second alternate embodiment of the present invention is shown. Figures 8A and 8B illustrate an embodiment whereby the communication server 122 operates to dynamically assign second telephone numbers to user telephony communication devices which connect to the remote data site. Figures 8A and 8B also illustrate an embodiment whereby the communication server 122 at the remote data site operates to perform the call forwarding operation. As discussed above, the call forwarding operation is performed in order to maintain telephone connectivity while data communications are being performed.

As shown, in step 502 the user telephony communications device connects to the remote data site on a communication line. In step 502 the user telephony communications device makes a telephone call on a communication line or telephone line to a communication

server 122 at the remote data site. This involves the user telephony communications device or modem 104 dialing the telephone number of the remote data site to establish a telephone connection.

After the user telephony communications device connects to the remote data site on the communications line, in step 504 the communication server 122 at the remote data site assigns a second telephone number to the user telephony communications device. As discussed above, the user telephony communications device has a first assigned telephone number, which is the main telephone number that is used to dial or call the telephony communications device. Thus, after the user telephony communications device connects to the remote data site on the communications line in step 502, the remote data site assigns a second telephone number to the user telephony communications device in step 504. This second telephone number is used at the remote data site for call forwarding as discussed below.

In step 506 the communication server 122 at the remote data site performs a call forwarding operation to call forward telephone calls made to the first telephone number to be forwarded to the second assigned telephone number. In other words, in step 506 the communication server 122 at the remote data site performs a call forwarding operation which directs that telephone calls that would normally be made to the first telephone number assigned to the remote user should instead be routed to the second telephone number which is being maintained at the remote data site. As noted above, the call forwarding operation may comprise a standard call forwarding operation, such as using "72#", or the operation may comprise use of other telephony features such as call diversion to another number in the case of a busy line.

In this embodiment, the communication server 122 at the remote data site performs the call forwarding operation. This differs from the above embodiments, where the user telephony communications device performs the call forwarding operation. Also, in this embodiment the second telephone number may be statically assigned once or dynamically assigned on each connection.

Once the communication server 122 at the remote data site has performed this call forwarding operating in step 506, in step 512 the user telephony communications device performs data transfers with the remote data site using the communication line. For example,

if the remote user is a home user who desires to perform Internet access, and the remote data site is an Internet access provider that provides access to the Internet, the user telephony communications device performs various web browsing or other Internet access functions. If the remote user is a telecommuter operating at home and desiring to connect to the corporate LAN, then the user performs various file access or other data access or communications functions with the local area network of the corporate office.

Figure 8B - Communication Server Receives Call to Assigned Second Telephone Number

While the user is performing data communications on the communication line with the remote data site, if another party places a telephone call to the remote user using the first telephone number, i.e., the first telephone number assigned to the communications line being used by user telephony communications device, the call forwarding operation performed in step 506 causes the telephone company central office to forward or route the telephone call made to the first telephone number to the second telephone number, i.e., causes the telephone call to be forwarded or routed to the second telephone number. As noted above, this second telephone number is maintained by the remote data site. The operations performed by the communications server 122 at the remote data site in steps 513 - 520 of Figure 8B are substantially similar to steps 413-420 of Figure 6C and steps 313 - 320 of Figure 3B.

Figures 9 - 14: Telephone Wiring Embodiment to Ring Extensions

Figure 9

Referring now to Figure 9, a block diagram is shown of a telecommunications system including a modem 104 which does not embody the present invention. This diagram serves to illustrate advantages of the present invention. The telecommunications system comprises a telephone line 108 coming from the PSTN into the protector block 34 of a home or other premises. The system further comprises first and second conductor pairs 46 and 44, respectively. The first and second conductor pairs 46 and 44 transfer telephone signals within the house. The first conductor pair 46 is connected to the telephone line 108.

Typically, the first and second conductor pairs 46 and 44 are comprised within a single cable having a connector which plugs into a jack in the protector block. The cable connector and jack are configured to connect the telephone line and conductor pairs as described.

One or more telephone instruments, 13A through 13N (referred to collectively as 13),
5 are coupled to the first conductor pair 46. Since the first conductor pair 46 is coupled to the telephone line 108, the telephones 13 are also coupled to the telephone line 108. The telephones 13 are rung by a ringing signal generated by a ring generator provided within a Central Office (CO) of the PSTN at the far end of the telephone line 108.

A line interface 32 of the modem 104 comprises a switch which closes (goes off
10 hook) to place a call to the remote data site. The modem 104 places the call to the remote data site and establishes a data connection with the remote data site in order to perform data communications with the remote data site. When the switch closes, a circuit is completed with the CO at the far end of the telephone line 108. In the closed circuit condition, the CO can not generate a ring signal on the telephone line 108 to place a call on the telephone line
15 108. In other words, the CO can not place a call on the telephone line 108 since the telephone line 108 is "busy", i.e., off hook, when the modem 104 and remote data site are in data communication.

As previously described, when a third subscriber places a call to the telephone line phone number, the call is forwarded to the remote data site. When the remote data site wants
20 to route the call to the telephone line number, the remote data site must notify the modem 104 by some other means than having the CO at the far end of the telephone line 108 generate a ringing voltage on the telephone line 108, since the telephone line 108 is busy. Thus, as previously described, the modem in the communication server 122 preferably transmits a data packet to the modem 104 which includes an indication of an incoming call.
25 The data packet may include, for example, an Internet Protocol (IP) data packet, or a data frame, such as a V.42 protocol data frame.

Control circuitry in the modem 104, such as the controller 24, receives the data packet and acts to provide the subscriber with an indication of the incoming call. In one embodiment, the controller 24 controls a ring generator in a CO simulator circuit 30 to ring a
30 second telephone 106 coupled to the ring generator in the CO simulator 30. In another embodiment, the controller 24 provides an indication of the incoming call to the computer

102. In response, the computer 102 provides an indication to the user such as beeping the speaker of the computer 102, displaying a visual indication of the incoming call on the display screen of the computer 102, or simulating the sound of a telephone ringing, for example.

5 However, as may be readily observed, the modem 104 has no means to ring the other telephone 13 extensions in the house. This may be problematic if the subscriber is not in sufficient proximity to the computer 102 and/or telephone 106 to receive the indication of the incoming phone call. Thus, a system and method is desired which enables each of the other telephones 13 coupled to the first conductor pair 46 to ring. Such a system and method will
10 be described below with reference to Figures 3 through 6.

Figures 10 through 12 - Telephone Wiring Embodiments to Ring Other Extensions

Referring now to Figure 10, an illustration of a home which is coupled to a standard
15 POTS telephone line 108 is shown. The telephone line 108 comes from the PSTN to a protector block 34 on the outside of the home or premises. Typically, homes wired prior to 1990 receive Station-D house wiring comprising two wire pairs. The first wire pair is a red/green wire pair. The second pair is a yellow/black wire pair. In homes which only subscribe to one telephone line, the yellow/black pair is unused. Typically, homes wired
20 subsequent to 1990 receive twisted pair cable comprising two, three or four wire pairs. The first pair is a blue/white and white/blue wire pair. The second pair is an orange/white and white/orange wire pair.

As mentioned above, the present invention includes a novel system and method for rewiring the home so that other telephone instruments ring when a telephone call is routed
25 from the remote data site to the home user on the single telephone line. In this embodiment, the modem 104 of Figure 1 operates to regenerate the telephony signals, such as a ringing signal, for the telephones in the house. The present invention employs a wiring device 38, preferably coupled to the protector block 34, for advantageously wiring the telephone line 108 to a second conductor pair within the home.

30 Referring now to Figure 11, a block diagram is shown of a telecommunications system including the wiring device 38 of Figure 10 and the modem 104 of Figure 1

according to one embodiment of the present invention. The telecommunications system comprises a telephone line 108 coming from the PSTN into the protector block 34 of a home or other premises. The system further comprises first and second conductor pairs 46 and 44, respectively. The first and second conductor pairs 46 and 44 transfer telephone signals within the house. Under normal operating conditions, i.e., when the wiring device 38 of the present invention is not employed, the first conductor pair 46 is connected to the telephone line 108, as shown in Figure 2. Typically, the first and second conductor pairs 46 and 44 are comprised within a single cable having a connector which plugs into a jack in the protector block. The cable connector and jack are configured to connect the telephone line and conductor pairs as described.

According to the present invention, the wiring device 38 is coupled between the two conductor pair cable connector and the protector block jack. Preferably, the wiring device 38 couples the telephone line 108 to the second conductor pair 44 as shown.

Referring briefly to Figure 12, one embodiment of the wiring device 38 is shown. The wiring device 38 comprises a device, comprising a male and female modular telephone connector. Preferably, the male connector couples to the protector block 34 and the female connector couples to a cable housing the conductor pairs 46 and 44 wired inside the house. Figure 12 illustrates the wiring device 38 connecting the incoming red/green pair of wires of the telephone line 108 to the second (yellow-black) conductor pair 44 inside the house.

Thus, the wiring device 38 switches the telephone line 108 from being connected to the first conductor pair 46, as it normally would be, to being connected to the second conductor pair 44. An embodiment is contemplated in which separate wiring devices may be placed at each of the telephone jacks within the premises for switching the first and second conductor pairs. However, the wiring device 38 advantageously requires only a single wiring device to perform the switching.

Referring again to Figure 11, one or more telephone instruments, or handsets, 13A through 13N (referred to collectively as 13), are coupled to the first conductor pair 46. As previously discussed, in the absence of the wiring device 38, the telephone line 108 is normally coupled to the first conductor pair 46. Thus, the telephones 13 would normally be coupled to the telephone line 108 via the first conductor pair 46 through the protector block 34. As a result, the telephones 13 would be rung by a ringing signal generated by a ring

generator provided within a Central Office (CO) of the PSTN. However, with the employment of the wiring device 38, the telephones 13 are now decoupled from the CO.

The modem 104 is coupled to the first and second conductor pairs 46 and 44. Preferably, the modem is also coupled to the computer 102 of Figure 1. The modem 104 performs data communications between the computer 102 and the communications server 122 of Figure 1 on the telephone line 108 as described previously. A telephone instrument 106 of Figure 1 is coupled to the modem 104. The modem 104 also performs voice communications on the telephone line 108 between a subscriber speaking on the telephone instrument 106 and a second subscriber coupled to the communications server 122 as described previously.

The modem 104 comprises a line interface circuit 32 coupled to the second conductor pair 44. Preferably, the line interface 32 comprises various circuits commonly used in telephony devices such as a "hook" switch, surge suppression circuits, impedance matching circuits, a ringing voltage detector circuit, and telephony interface transformer. When the computer 102 desires to connect to the remote data site, the switch in the line interface 32 closes (goes off hook) to create a closed circuit with the CO at the other end of the telephone line 108 for the purpose of making a telephone call. When the switch closes (hook goes off hook), the line interface 32 draws current on the second conductor pair 44, as will be discussed below. A full-duplex analog signal passes through the line interface 32 between the telephone line 108 and a data pump 20 coupled to the line interface 32.

Data pumps are well known in the art of modem design. In one embodiment, the data pump 20 is a Lucent Technologies M-1634. The data pump performs the functions, among others, of modulating digital data for transmission as an analog signal on the second conductor pair 44 and demodulating modulated data received from the second conductor pair 44 into digital data. Preferably, the data pump 20 comprises an interface for transferring data frames, or data packets, between an interface comprised in a controller 24.

The controller 24 performs various control functions of the modem 104. Preferably, the modem 104 is a Digital Simultaneous Voice-Data (DSVD) modem, and the controller 24 demultiplexes simultaneously transmitted, i.e., multiplexed, speech and data frames received from a far end DSVD modem comprised in the communications server 122. The controller 24 is operable to receive compressed speech frames, i.e., voice encoded speech, from the data

pump 20 and provide the data frames to a codec 28 coupled to the controller 24. The controller 24 is also operable to receive compressed speech frames from the codec 28 and provide the compressed speech frames to the data pump 20. Preferably, the controller 24 is also operably coupled to the computer 102. In one embodiment, the controller 24 is coupled
5 to the computer 102 by an expansion bus, such as an Industry Standard Architecture (ISA) or Peripheral Component Interconnect (PCI) bus, through bus interface circuitry. The controller 24 receives data from and sends data to the computer 102 for exchange with the communications server 122.

In particular, the controller 24 is operable to execute instructions to control the codec
10 28 and data pump 20 to provide the user a means to receive telephone calls on the telephone line 108 while performing data transfers with the communications server 122 on the telephone line 108. The controller 24 comprises any processor device which is capable of executing a stored program of instructions including a task within computer 102. Preferably, the controller 24 comprises a processor, such as a microprocessor core and peripheral
15 devices, such as the asynchronous serial interface. In one embodiment, the controller 24 is a Zilog Z80182 microcontroller.

Preferably, the stored program instructions which the controller 24 executes are comprised within a memory (not shown), such as a read-only memory (ROM), programmable ROM (PROM), erasable PROM (EPROM), FLASH memory, dynamic
20 random access memory (DRAM), static random access memory (SRAM), among others, or a combination thereof. The memory is used to store programs instructions and data executed by the controller 24. The memory comprises frame buffers used to buffer frames received from the data pump 20 before being provided to the codec 28, and to buffer frames received from the codec 28 before being provided to the data pump 20. Preferably, the asynchronous
25 serial port on the controller 24 receives bytes or blocks of data, and the controller 24 places the bytes or blocks of data into one of the frame buffers until an entire frame has been placed into the buffer. The memory may be comprised within or without the controller 24.

Codecs, such as codec 28, are well known in the art of voice encoded speech. Preferably, the codec 28 comprises an AT&T 1635. The codec 28 performs, among others,
30 encoding of speech received from the telephone 106 and providing the compressed speech frames to the controller 24. The codec 28 further receives compressed speech frames from

the controller 24 and decodes the compressed speech frames back into analog voice signals which are provided to the telephone 106 for reproduction to the subscriber.

In one embodiment, a compressed speech frame comprises 39 characters, or bytes. Of the 39 bytes, 32 of the bytes comprise voice encoded speech, 5 of the bytes comprise standard protocol control bytes, such as v.42 protocol bytes, and 2 bytes comprise voice frame specific control bytes. Preferably, the standard protocol bytes comprise error checking and/or error correction bytes, such as cyclic redundancy code (CRC) bytes. The voice encoded speech bytes comprise parameters which specify an encoded representation of the speech received by the codec 28 from the telephones 106 and 13 or received from the remote data site via the telephone line 108.

As discussed previously, the communications server 122 sends one or more data frames to the modem 104 to notify the modem 104 of an telephone call placed to the telephone line 108 telephone number. Preferably, the data frame conforms to the compressed speech frame format just described. Preferably, a code indicating the incoming telephone call is placed by the communication server 122 in one or both of the 2 voice frame specific control bytes or is placed in one or more of the 5 standard protocol control bytes.

The codec 28 is coupled to a Central Office (CO) simulator circuit 30. The CO simulator 30, also referred to as a telephone instrument interface circuit herein, simulates a portion of the operations of the CO of the PSTN. This is necessary since the employment of the wiring device 38 causes the telephones 106 and 13 to no longer be coupled to the CO. In particular, the CO simulator 30 comprises circuitry for detecting on hook and off hook conditions generated by telephone 106 and/or telephones 13. The CO simulator 30 communicates the detection of on and off hook conditions to the controller 24. Preferably, the CO simulator 30 comprises a ring generator for ringing the telephones 13 and 106.

A relay 22 is coupled to the CO simulator 30, the first conductor pair 46, and the second conductor pair 44 as shown. When the switch in the line interface 32 is open, i.e., the modem 104 is not in use, the relay 22 connects the first conductor pair 46 to the second conductor pair 44. Thus in an on-hook condition, the telephones 106 and 13 are connected to the telephone line 108, through the first and second conductor pairs 46 and 44, to operate as they would in the absence of the wiring device 38 and modem 104. In particular, when the CO generates a ringing voltage on the telephone line 108, the ringing voltage reaches the

telephones 106 and 13 to ring their ringers. Likewise, when the telephones 106 and 13 generate off-hook or on-hook conditions, i.e., open or closed circuits, the conditions are sensed by the CO at the far end of the telephone line 108. Furthermore, voice signals travel through the first conductor pair 46, through the relay 22, through the second conductor pair 44, through the wiring device 38, and through the telephone line 108 between the CO and telephones 106 and 13. It is noted that this function of the relay 22 is advantageous in the event of a loss of power to the modem 104, whereby the telephones 13 are operable to function as they would in the absence of the wiring device 38 and modem 104.

When the switch in the line interface 32 is closed, i.e., the modem 104 is in use, the relay 22 connects the first conductor pair 46 to the CO simulator 30, rather than the second conductor pair 44. When the CO simulator 30 is connected to the telephones 106 and 13, the ring generator in the CO simulator 30 is capable of ringing the telephones 13 and 106. The ring generator is controlled by the controller 24 to ring the telephones 13 and 106 at the appropriate time. In particular, when the controller 24 detects signals indicating that a call is coming in on the telephone line 108, such as a data packet indicating an incoming call, the controller 24 instructs the CO simulator ringing circuit to generate a ringing signal, i.e., a ringing voltage. Preferably, when the controller 24 is performing data communications with the communications server 122, the communications server 122 transmits a data packet to the modem 104 which includes command codes indicating a ring signal, as previously discussed. That is, the communications server 122 attempts to place a call to the modem 104 to perform voice communications by sending a data frame including the appropriate command code understood by the modem 104 to be a ring signal. The relay 22 advantageously prevents the CO simulator 30 from being coupled to the actual CO in the PSTN.

In one embodiment, the relay 22 comprises a double pole double throw relay as shown in Figure 13. The relay 22 may comprise electromechanical, electrical, or preferably, optoelectronic relay devices. Preferably, the relay 22 is controlled by a line current sensing circuit 31. The circuit 31 senses current draw by the line interface 32 on the second conductor pair 44. When current draw is sensed, the relay 22 connects the first conductor pair 46 to the CO simulator 30, and thus to the telephones 13 and 106. However, when current draw is not sensed, the relay 22 connects the first conductor pair 46 to the second conductor pair 44, thereby connecting the telephones 106 and 13 to the telephone line 108.

Figure 13 also shows a modular connector used to connect the first and second conductor pairs 46 and 44 to the modem 104.

Although the relay 22 and relay control circuit 31 are shown to be comprised within the modem 104 in Figure 4, it is noted that the relay 22 and relay control circuit 31 may be comprised outside of the modem 104. In one embodiment, the relay 22 and relay control circuit 31 are comprised within a second wiring device, which is coupled between the modem 104 and the first and second conductor pairs 46 and 44.

Preferably, the second wiring device further comprises a ring generator or ring booster circuit for ringing the telephones 13. The relay 22 is coupled between the first conductor pair 46 and the ring generator. This embodiment advantageously alleviates the ring generator in the CO simulator 30 from having a powerful enough ring generator to ring all of the telephones 13 in the event that there are many telephones 13.

Furthermore, where the telephone instrument 106 does not have a ringer, e.g., a headset telephone device comprising only a speaker and microphone, the CO simulator 30 is alleviated from having a ring generator at all. This is particularly advantageous where the modem 104 is comprised within an environment allowing restricted power consumption or space. An example of such an environment is in a notebook computer. In one embodiment, the modem 104 is a PCMCIA modem, for example. Preferably, the subscriber is notified of an incoming call by the computer 102 to which the modem 104 is coupled. For example, the computer 102 may beep, simulate the sound of a telephone ringing, and/or notify the subscriber in a graphical manner on the computer screen of the incoming call.

Figure 14 - Alternate Embodiment

Referring now to Figure 14, a block diagram is shown of a telecommunications system including the wiring device 38 of Figure 10 according to an alternate embodiment of the present invention. The embodiment of Figure 14 is similar to that of Figure 11, and corresponding circuit portions are numbered identically for simplicity and clarity. In the embodiment of Figure 14, the relay 22 and relay control circuit 31 are comprised in a second wiring device 54, as shown. The second wiring device 54, is coupled between the modem 104 and the first and second conductor pairs 46 and 44.

Preferably, the second wiring device 54 further comprises a ring generator, included in a CO simulator 30, for ringing the telephones 13. The relay 22 is coupled between the first conductor pair 46 and the ring generator. The second wiring device 54 couples the second conductor pair 44 to the modem 104.

5 In this embodiment, the modem 104 may be a conventional modem as is well known in the art of modem design. In particular, the conventional modem does not necessarily comprise the CO simulator 30 and relay 22, and/or codec 28. Rather, the modem 104 is capable of performing data communications between the computer 102 and the remote data site. That is, the modem 104 is capable of receiving a data stream from the computer 102, modulating the data stream, and transmitting the modulated data stream on the telephone line 108 to the remote data site. Conversely, the modem 104 is capable of receiving a modulated data stream from the telephone line 108 and demodulating the received modulated data stream into a data stream to provide to the computer 102.

In this embodiment, the first subscriber speaks into a microphone 52 of the computer 15 102 and listens via a speaker 50 of the computer 102. Preferably, the microphone 52 and speaker 50 are comprised as part of a sound card or other audio device of the computer 102. The audio device receives the first subscriber's speech and transforms the speech into digital voice data. Preferably, the computer 102 transforms the digital voice data into another format, such as encoded and/or compressed voice data. The subscriber's speech may be encoded by various techniques, such as GSM encoding techniques, voice encoding 20 techniques, etc.

The computer 102 then multiplexes the encoded voice data with other data into a data stream. The other data is the data of the data communications being performed between the computer 102 and the remote data site, such as Internet data. The multiplexed data stream is 25 then provided to the modem 104. The modem 104 transmits the data stream to the remote data site. Preferably, the computer 102 packetizes the data stream into a stream of data packets, such as Internet Protocol (IP) packets, and provides the data packet stream to the modem 104 for modulation and transmission to the remote data site. Thus, the encoded voice is transmitted in packets, such as IP packets or other packets, to the remote data site. 30 The communications server 122, or voice gateway 122 of Figure 1, at the remote data site receives the stream of data packets and de-multiplexes the Internet data from the encoded

voice data. The voice data is then transmitted by the communications server 122 to the second subscriber through the PSTN. The Internet data is provided to the data server 124, i.e., the Internet.

Conversely, the communications server 122 receives voice signals from the second subscriber and converts the voice signals into data. The communications server 122 also receives data from the data server 124. The communications server 122 multiplexes the voice and data into a data stream and sends the data stream to the modem 104 on the telephone line 108. The modem receives the data stream and provides it to the computer 102. The computer 102 de-multiplexes the Internet data and speech data. If the speech data is encoded, preferably, the computer processor decodes the speech. The computer 102 provides the decoded speech to the audio device which plays the speech on the computer's speaker 50.

Thus, the first subscriber performs voice communications with the second subscriber coupled to the communications server 122 through the PSTN on the telephone line 108 while performing data communications with the remote data site on the telephone line 108.

Where the remote data site is an ISP, when the subscriber dials up the ISP, an Internet connection is established between the subscriber and the ISP, such as a Point-to-Point Protocol (PPP) or Serial Line Internet Protocol (SLIP) connection. When the Internet connection is established, the ISP creates an IP address for the subscriber. When the ISP receives a telephone call directed at the subscriber but which was forwarded to the ISP, as previously described, the ISP matches the incoming call to the created IP address. The ISP then sends a signal indicating the incoming call to subscriber's computer 102. Preferably, the signal indicating the incoming call comprises data in one or more data packets, such as IP packets. The computer 102 receives the packet indicating the incoming call and notifies the subscriber of the incoming call. Preferably, the computer 102 notifies the subscriber of the incoming call visibly, such as via an icon on the computer's display screen, or audibly, such as via the speaker 50.

Furthermore, when the computer 102 receives the packet indicating the incoming call, the computer 102 controls the ringer in the wiring device 54 to generate a ringing voltage to ring the telephone extensions 13. Thus, the subscriber may advantageously be notified of the incoming call in the event that the subscriber is not situated so as to detect the notification of

the incoming call from the computer 102, such as the visual or audible notification. That is, rather than the modem 104 detecting the data packet indicating the incoming call and in response controlling the ring generator, as in the embodiment of Figure 11, in the embodiment of Figure 14, the computer 102 detects the data packet indicating the incoming
5 call and in response controls the ring generator to ring the extensions 13.

Various means are contemplated for the computer 102 to control the ring generator to ring the telephones 13. Exemplary means are recited here for illustration purposes, although other means may be apparent to one skilled in the art. The computer 102 may control the ring generator by means of an interface, such as a serial, parallel, Universal Serial Bus
10 (USB), IEEE 1394 or other such interface coupled between the computer 102 and the wiring device 54, as shown. Furthermore, the computer 102 may control the ring generator through the modem 104. Furthermore, the computer 102 may include an expansion card which couples to an expansion slot in the computer 102, wherein the expansion card interfaces to the ring generator to control the ring generator in response to being programmed by the
15 computer 102. Preferably, the various operations described which are performed by the computer 102 are performed, at least in part, by software executing on the computer 102.

In one embodiment, the remote data site provides information to the subscriber's computer 102 which identifies the caller of the incoming call. When the computer 102 provides the subscriber with the indication of the incoming call, the computer 102 also
20 identifies the caller who placed the incoming call, such as on the computer's display screen or audibly via the speaker 50. Thus, the subscriber may advantageously selectively answer the call.

Conclusion

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Therefore, a system is shown which enables a remote user to connect to a remote data site on a communication line, such as a telephone line, while maintaining the ability to receive incoming telephone calls on the telephone line. The present invention thus allows a remote user to connect to a remote data site, such as a corporate office or Internet Service
30 Provider, on a single telephone line, while also maintaining the ability to receive telephone calls on this single telephone line. This obviates the necessity of the user having to purchase

a second telephone line for incoming calls while data communications are being performed, thus reducing access costs.

Although the system and method of the present invention has been described in connection with the preferred embodiment, it is not intended to be limited to the specific form set forth herein, but on the contrary, it is intended to cover such alternatives, 5 modifications, and equivalents, as can be reasonably included within the spirit and scope of the invention as defined by the appended claims.